

# The Geographical magazine

March 1980 60p

AUSTRALIA \$1.80  
CANADA & U.S.A. \$2.50  
MALAYSIA \$4.60  
NEW ZEALAND \$1.40

## Conflict in the Cairngorms

**FREE** inside  
Map  
from  
*Saxton's*  
*1579 atlas*



<b>Contents: March 1980</b>		Volume LII Number 6
<b>Local energy is best for North America</b>		
Continental policy	John Fernie	385
<b>Belgian with tears</b>		
Linguistic problems	R. W. G. Penn	387
<b>Quiet revolution</b>		
Astronomy	John Gribbin	391
<b>Eco-fanatic's use for Hansards</b>		
Geographer MP	Peter Rost	394
<b>Sandy land of Qatar</b>		
Archaeology	Francis Celoria	395
<b>Lasting image of the Elizabethan era</b>		
Christopher Saxton: influential cartographer	Victor Morgan	401
<b>Plantations created the South</b>		
Fashioning the American landscape, 6	Sam Hilliard	409
<b>Conflict in the Cairngorms</b>		
Price of progress	J. T. Coppock	417
Mountains in the making	David Sugden and Rod Ward	425
Policies for protection	Adam Watson	427
<b>Stout hearts in South America</b>		
Royal Geographical Society's exploration commitment, 1	Dorothy Middleton	434
<b>THE POSSIBLE DREAM</b>		
A gîte in Corrèze	James E. Wrathall	441
<b>News and Reviews</b>		
		443

**Cover:** Cairn Gorm. Photography by Aviemore Photographs.

Authors

Dr Francis Celoria is director of the Gladstone Pottery Museum, Staffordshire.  
 John Fernie is lecturer in geography at Huddersfield Polytechnic.  
 J. T. Coppock is professor of geography at the University of Edinburgh.  
 Dr John Gribbin is a writer and physics consultant to *New Scientist*.  
 Sam Hilliard is professor in the department of geography and anthropology at Louisiana State University, USA.  
 Dorothy Middleton is the author of *Baker of the Nile*, *Victorian Lady Travellers* and other works on travel, and was formerly Assistant Editor of *Geographical Journal*.  
 Dr Victor Morgan is lecturer in English history in the School of English and American Studies at the University of East Anglia.  
 R. W. G. Penn is a writer who is also currently teaching geography and economics in Brussels.  
 Peter Rost is the Member of Parliament for Derbyshire South-East and a geography graduate of Birmingham University.  
 Dr David Sugden is senior lecturer in geography at the University of Aberdeen.  
 Rod Ward is a postgraduate student in geography at the University of Aberdeen.  
 Dr Adam Watson is senior principal scientific officer in the Institute of Terrestrial Ecology.  
 James E. Wrathall is principal lecturer in geography at Huddersfield Polytechnic.

© IPC Magazines Ltd 1980  
 Postal Address: THE GEOGRAPHICAL MAGAZINE: 1 Kensington Gore, London SW7 2AR. Telephone: 01-584 4436. Telegrams: Boundless, London SW7.  
 Back Numbers: 90p each including postage (payment with order): IPC Magazines, Lavington House, Lavington Street, London SE1.  
 Subscriptions: IPC Business Press Ltd, Oakfield House, Perrymount Road, Haywards Heath, West Sussex, RH16 3DH. Telephone: 0444 59188.  
 THE GEOGRAPHICAL MAGAZINE published monthly.  
 Prices quoted in this issue were correct at the time of going to press.  
 Second class postage paid at New York, N.Y.  
 Subscription rates: \$26.80 surface mail, \$40.10 air mail.

One-half of all dividends on the Ordinary Shares of THE GEOGRAPHICAL MAGAZINE LIMITED are assigned to a fund for the advancement of exploration and research and the promotion of geographical knowledge. The fund is administered by a Board of Trustees, whose Chairman is the President of the Royal Geographical Society or his nominee.

<b>Editor: Derek Weber</b>	<b>Assistant Editor: Rosalynde Cossey</b>
<b>Art Editor: Ashley Pope</b>	<b>Geography Editor: Iain Bain</b>
<b>Assistant Art Editor: Jean Lidbrooke</b>	<b>Sub-editor: Charles Piggott</b>
<b>Advertisement Manager: Terry Pond: 01-261 6336</b>	

# Local energy is best for North America

by John Fernie

**North America need not have an energy crisis. Although nationalistic concerns over energy security would override any concept of a common energy market, a continental energy policy makes economic and environmental sense, as John Fernie explains**

During oil shortages in July 1979, potential US presidential candidates expressed the idea of an energy common market to lessen American dependence upon imported OPEC oil. The gist of their argument was that in exchange for financial and technological expertise, her two neighbours would supply the US with oil and gas; the Canadians, in turn, would supply Mexico with Candu nuclear technology to guarantee future power supplies in exchange for oil for East Canadian markets. The US plan has received lukewarm response from Mexico and Canada as the economic advantages of such a scheme would undoubtedly be undermined by political realities.

The US situation with regard to the importation of oil is urgent. Since the 'energy crisis' and President Nixon's abortive 'Project Independence', the US has become more rather than less dependent upon foreign oil. From 1973 to 1979, the oil quota system was scrapped and replaced by fees levied on imported oil. The net result was an increasing dependence on foreign oil. In 1972 - the last year of the quota system - the US imported 4,700,000 barrels a day, 29 per cent of the domestic demand. The upturn in the economy from 1975 to 1977 led to an increase in demand for oil and record imports were registered in 1977 at 8,800,000 barrels a day. Imports levelled off at 8,200,000 barrels a day until 1979 when Iranian production cuts forced US requirements down to 7,700,000 barrels a day - 43 per cent of domestic demand.

For the future, President Carter has committed the US to a quota system - a ceiling of 8,600,000 barrels a day. Meanwhile, south of the border, oil and gas have been discovered at rates that have made Mexico a major oil producer. Reserves are being constantly upgraded and in 1979 'proven' reserves were estimated at 40,000,000,000 barrels with an ultimate potential of 200,000,000,000 recoverable reserves. Production has increased from 900,000 barrels a day in 1976 to 1,500,000 barrels a day in 1979, with 400,000 barrels a day being exported to the US in 1979 to augment supplies from the Texas and Louisiana fields. US imports of Mexican oil are expected to increase by two to three times by the early-1980s; however, this will only make a minor contribution to US domestic oil consumption, which is currently 18,000,000 barrels a day.

Recent visits by President Carter and other diplomats from oil-thirsty Western countries reflect the hope that Mexican oil potential will be exploited quickly thus ensuring continuity of supplies in the event of any further disruption of supplies from the Middle East. The Mexican's inherent suspicion of foreign oil companies pre-dates expropriation in 1938, and because of her insistence on using domestic labour and technology where possible, the pace of development will be slow. In a country with a fast growing population, acute problems of rural and urban deprivation exist; the oil bonanza must therefore be carefully managed to ensure a better standard of living for all Mexicans.

Mexican oil will find its way to the US market for sound commercial reasons, but the US are likely to receive limited cooperation with their offer of technological assistance if the 'common market' proposal was implemented. Relations between the two countries have not been enhanced after Schlesinger, former US Energy Minister, cancelled plans to buy Mexican gas because of its high price when the pipeline from south-east Mexico to Texas was nearing completion. Unless the political climate improves, Mexico is more likely to seek help from Canada through the state oil company, Petro-Canada, rather than the privately owned US companies.

A net \$1,500,000,000 surplus on energy trading in 1978, with abundant reserves of coal, gas and 'unconventional' heavy oils yet to be tapped, gives Canada a promising energy future. Unfortunately,



Nature Reserve. The Highland Regional Council has set up a working party, of which NCC is represented, to review both possible sites for major ski developments in Scotland and the market for skiing. Conservationists are also apprehensive of a complementary proposal, for which outline planning permission has already been given, for a major expansion of accommodation at Dalhfaber in Aviemore, which would virtually double the overnight capacity of the village. Other concerns are the recreational use of helicopters and the improvements to the A9, which may encourage more tourists.

A major problem in the Cairngorms, as in other areas of high amenity, high conservation value and high recreation/tourist pressures, is devising strategies that permit the various interests to be properly evaluated and, if possible, reconciled. In theory, the local plan should achieve this end, but many aspects are excluded from planning control and tend to receive only cursory treatment. National interests are also involved. Components of such strategies already exist or are in preparation; apart from the local plan, a management plan is being prepared for the Cairngorm NNR and NCC is also preparing a discussion document, Cairngorm Prospectus. Structures for bringing the different interests together also seem desirable. The national agencies already meet in a Speyside Wildlife Group and the Spey Valley Tourist Association brings together many of the private interests in development. The Regional Council is strongly opposed to any special administrative status for Cairngorm outside the framework of local government.

Patterns of land ownership and designation or proposed designation further complicate matters. The Forestry Commission owns Glenmore Forest Park, now a major recreational development in its own right, particularly around Loch Morlich, where a Water Sports Centre was opened in 1978 and a major information centre is planned later. In 1972, the Forestry Commission assigned the area of present and prospective ski development to the Highlands and Islands Development Board. By contrast, little land is owned by conservation bodies. The Nature Conservancy Council owns only a tenth of the Cairngorm National Nature Reserve, the rest being managed under a Nature Reserve Agreement, which is recognised to be a much less effective control over development and a way of securing the conservation interest. The Countryside Commission for Scotland, the other major conservation body which wishes to designate the Cairngorms as a National Heritage Area, owns no land.

An air of uncertainty hangs over the Cairngorms. The inquiry into the Regional Council's draft Structure Plan has recently been completed, but the outcome is unknown. Discussions are in progress about conservation of National Scenic Areas, the Cairngorm Prospectus is in preparation, the future of the Dalhfaber project is uncertain and the Working Party on Skiing has yet to report. Progress on by-passing the Speyside villages on the A9 continues. Underlying all proposals is uncertainty about future trends of tourism in the Highlands, in the light of the check to growth since 1973 and the rapid rise in the price of oil. In the meanwhile, the balance of forces seems weighted against the conservation interest. In the words of Sir Andrew Gilchrist, then Chairman of the Highlands and Islands Development Board: 'You cannot be a Board trying to restore the population, the self-respect and the social progress of an area and spend all the time defending the interests of solan geese.'

# Mountains in the making

by David Sugden and Rod Ward

**Products of fluvial erosion followed by intense glaciation, the landforms of the Cairngorms are still evolving under one of Britain's most extreme climatic regimes**

THE CAIRNGORM SUMMITS form the most extensive area of ground above an altitude of 1100 metres in Britain. They are almost high enough to support glaciers and fail by a margin of only 100 to 200 metres. On the summits air frosts occur on more than half the days in the year, while the mean annual temperature is close to the freezing point. Snowbeds persist throughout the year in a number of cliff recesses and melt only exceptionally. Rainfall and snowfall totals are high and amount to more than 225 centimetres per year. Winds are strong and in 1967 an anemograph on the Coire Cas chairlift recorded the highest gust ever on a standard instrument in Britain, 125 knots.

Conditions have not always been so severe and for several million years before the Ice Age the mountains basked in a humid, warm climate. It was under these conditions that the rolling topography of the Cairngorms evolved. Rivers incised valleys while the granite bedrock decomposed beneath a deep regolith. Remnants of this era are represented in the curious wart-like tors which rise incongruously above the gentle summit slopes to heights of up to twenty-five metres. Good examples can be seen on Beinn Mheadhoin and Ben Avon.

The impact of the Ice Age is most clearly reflected in the spectacular cliffs of the glens and

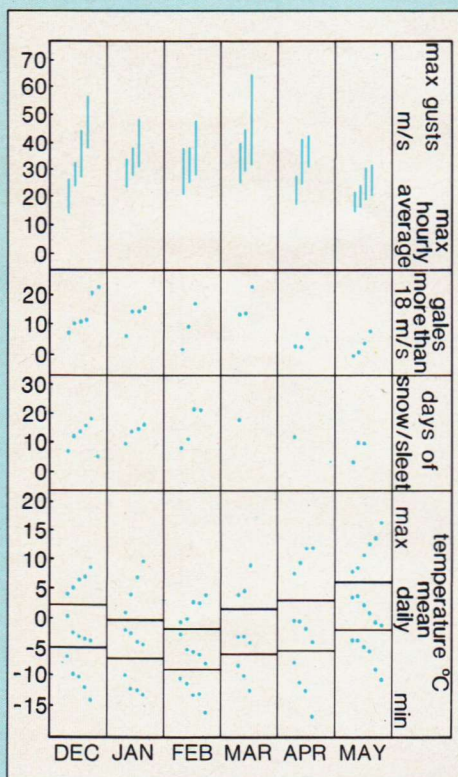


Rolling hills of the Cairngorms' high tops developed under warmer pre-glacial conditions. Granite bedrock rotted under a deep weathering layer leaving tors which were unaffected by later ice

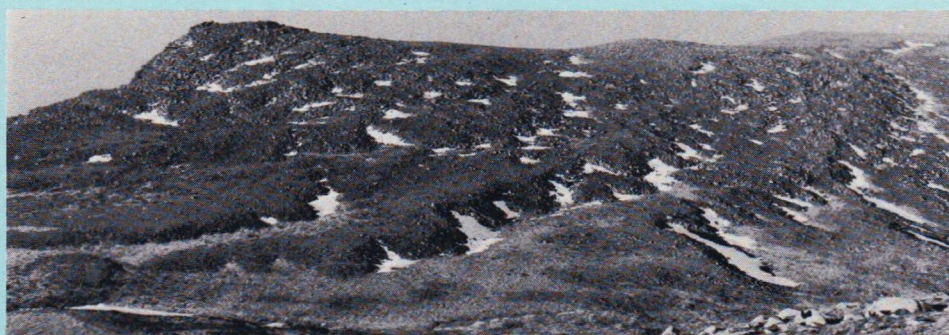




Clais Fhearnaig meltwater channel, between Glen Derry and Glen Quoich, carried a subglacial river flowing beneath the ice sheets of former glaciations



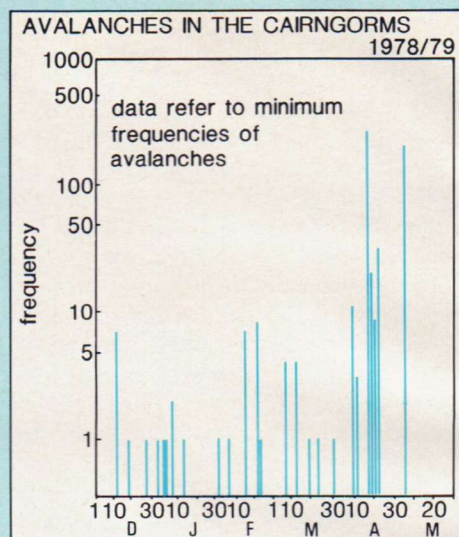
Less than 200 metres separate the plateau of the Cairngorms from present-day glaciation. Climate-related periglacial processes are active. Light snow picks out solifluction lobes in Lurcher's Gully



corries. Glens Einich, Geusachan, Avon and the Lairig Ghru are troughs cut beneath north-eastward flowing ice sheets which submerged the mountains. The uplands between the troughs survived the ordeal unscathed, probably because here the ice was cold-based and frozen to the ground. Thirty-odd corries scallop the margins of the massif and the interior valleys and represent occasions when small glaciers survived in only a number of favoured sites. This juxtaposition of pre-glacial gentle slopes and glacial cliffs is the hallmark of the Cairngorm scenery. You have to visit East Greenland or the eastern Canadian Arctic to find equally good examples.

Past glaciers have left their mark on other landforms in the mountains. Meltwater rivers beneath the ice sheets flowed across the mountains in the same direction as the ice. Traces of these subglacial courses are seen in the gorges cutting through watersheds and broad gravel ridges deposited as eskers on lower ground. A fine series of channels and associated eskers can be seen from the Coire Cas car park. In the valley bottoms throughout the Cairngorms irregular hummocky deposits reflect the final disappearance of large glaciers. The final deglaciation took place between 10,000 and 12,000 years ago, with the possible exception of the highest corries in the western Cairngorms which support arcuate boulder moraines, - one is the Corrie an-t-Sneachda adjacent to the ski lift. The inner corrie moraines may have been formed during the Little Ice Age in the 17th-19th centuries.

The fluctuating climate of the last 10,000 to 12,000 years is reflected in detailed surface features visible today. In the warmer period of the Climatic Optimum of 5000 to 7000 years ago pine trees were growing at altitudes of 800 metres, 150 metres higher than is probable under present conditions. Remains of these forests are preserved as tree stumps which are visible in peat bogs, for example near the Coire Cas car park. Periods of cooler conditions have produced periglacial landforms well known from the Arctic today. Above about 550 metres are solifluction lobes with their convex downslope edges bounded by a riser of boulders, one to four metres high. These lobes are most obvious when the edges are picked out after a snowfall, but even in summer they are highlighted by contrasts in vegetation. Stone polygons up to two metres across occur in some flat-lying, moist areas, for example at 1150 metres 1.5 kilometres north-north-west of Ben Macdui. On steeper slopes, for example on ridges west of Glen Einich, there are stone stripes which are two metres wide. The larger periglacial forms are probably relict and represent cooler conditions such as existed during the Little Ice Age and earlier. However, small patterns are forming today - stone polygons which were disturbed in



the waterlogged bottom of Coire Raibert reformed after a few years.

Present-day weathering, snow and water activity is constantly changing the face of the Cairngorms. The winter of 1962 produced large rockfalls which, along with more recent falls, are revealed by fresh pink scars in the granite cliffs. On a sunny day after a frost it is common to hear the clatter of falling stones released by melting. Snow avalanches are a dramatic geomorphic process of the winter and the spring, and are much more common than generally supposed. More than 200 avalanches were seen during one afternoon's flying in May 1979. The chief types are direct action avalanches which fall during or just after a storm, wet spring avalanches and cornice falls, and wind slab avalanches caused by excessive snow accumulation on lee side slopes during windy conditions. Major avalanches occur on slopes of around 35° and a fine example occurs most years in Coire an Lochain. Many avalanches transport boulders and trees as well as stripping vegetation. The action of water removes part of the gravel veneer of the Cairngorm summits especially in the spring. The effect is vividly demonstrated by gravel spreads which may be washed onto a melting snowbank. On valley slopes of 30 to 35° are gullies and scars of debris flows. The latter have levees on either side and a mound of debris at the bottom where they end. They form when the regolith is saturated and are commonly associated with storms. Twenty-five debris flows formed part of the Lairig Ghru following an intense rainstorm in October 1976. Such events can cause local flooding and part of the Cairngorm access road has been washed away on several occasions as the Allt Mor has swollen to torrential proportions.

People who have known the Cairngorms for a few decades suspect that there is more evidence of erosion today than, say, twenty years ago. Moreover, this increased erosion is not restricted to those areas which have experienced a large increase in visitors. If this intuitive feeling can be verified, then modern tourist developments must be seen against a general background of increasing rates of natural erosion. Such a trend would perhaps be expected in the light of the climatic deterioration since the 1940s. A shorter growing season might be expected to reduce the vegetation cover of the higher summits and thus expose more unprotected regolith to the processes of erosion. Thus the Cairngorm summits may be unusually fragile at the present time.